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(43) Application published 10 Oct 1979
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B65G 41/00
(52) Domestic classification
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GB 1313687
GB 590008
(58) Field of search
B8A
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Paul Michael Parker
(74) Agent
Phillips & Leigh

(54) Conveyor Belt Feeders

(57) In an endless loop conveyor belt feeder having belt rollers (2, 4) journalled on an elongate frame (3), the frame is supported by a cantilever structure (9, 10, 11) capable of supporting the frame along one side only, at least for when the feeder is not in use, to enable a preformed belt (1) to be passed over the other side of the frame and fitted over the rollers.

The belt feeder is preferably a belt weigher, the cantilever structure being C-shaped with a removable support pillar (12) having a built-in jack. The tail drum (4) may be mounted to slide longitudinally of the main frame for adjustment to belt length; means may be provided to set and maintain tension automatically; and quick-release dust covers may be provided.

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13 November 1979

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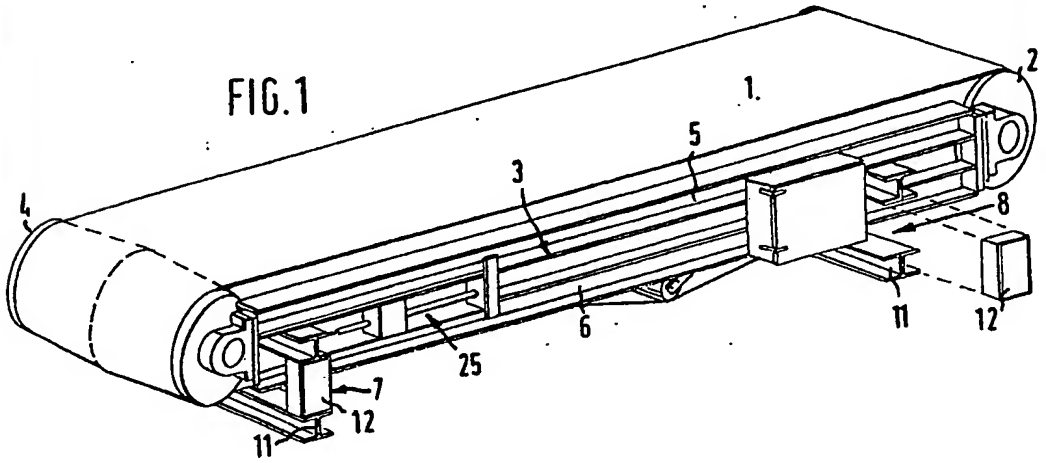
FIG.1



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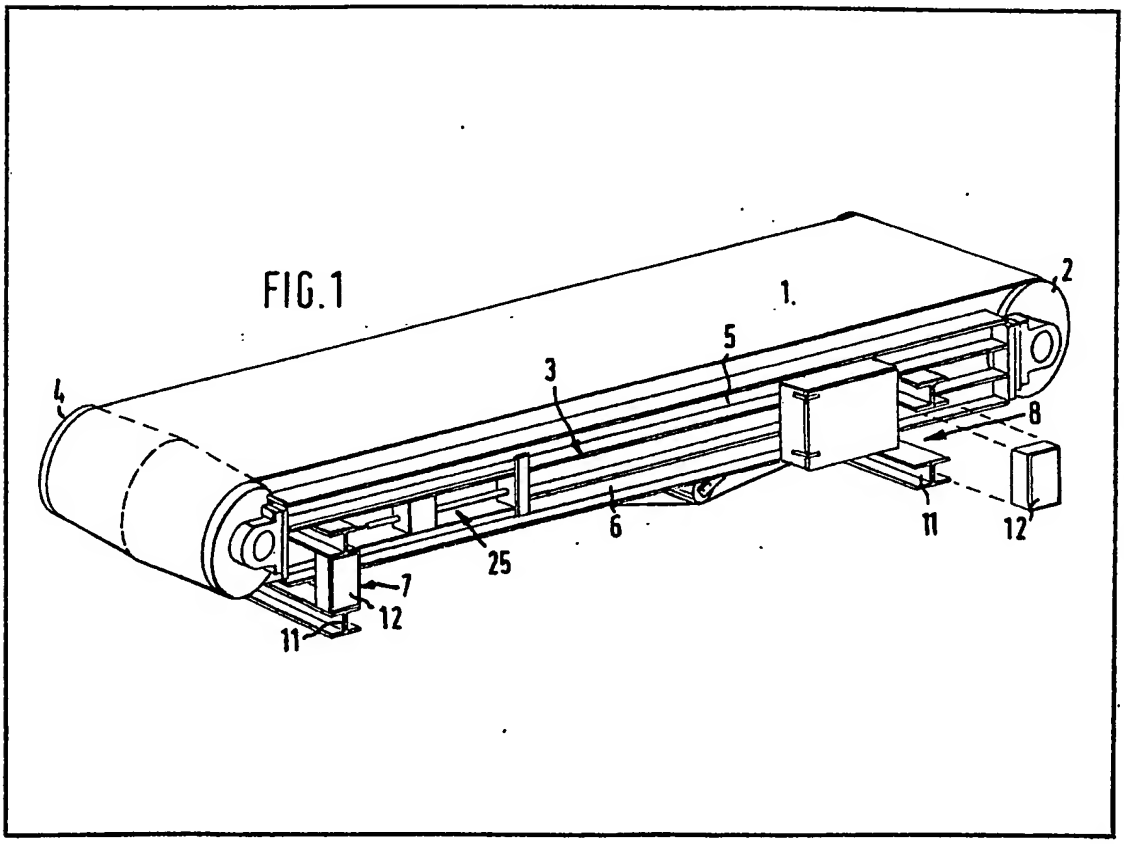

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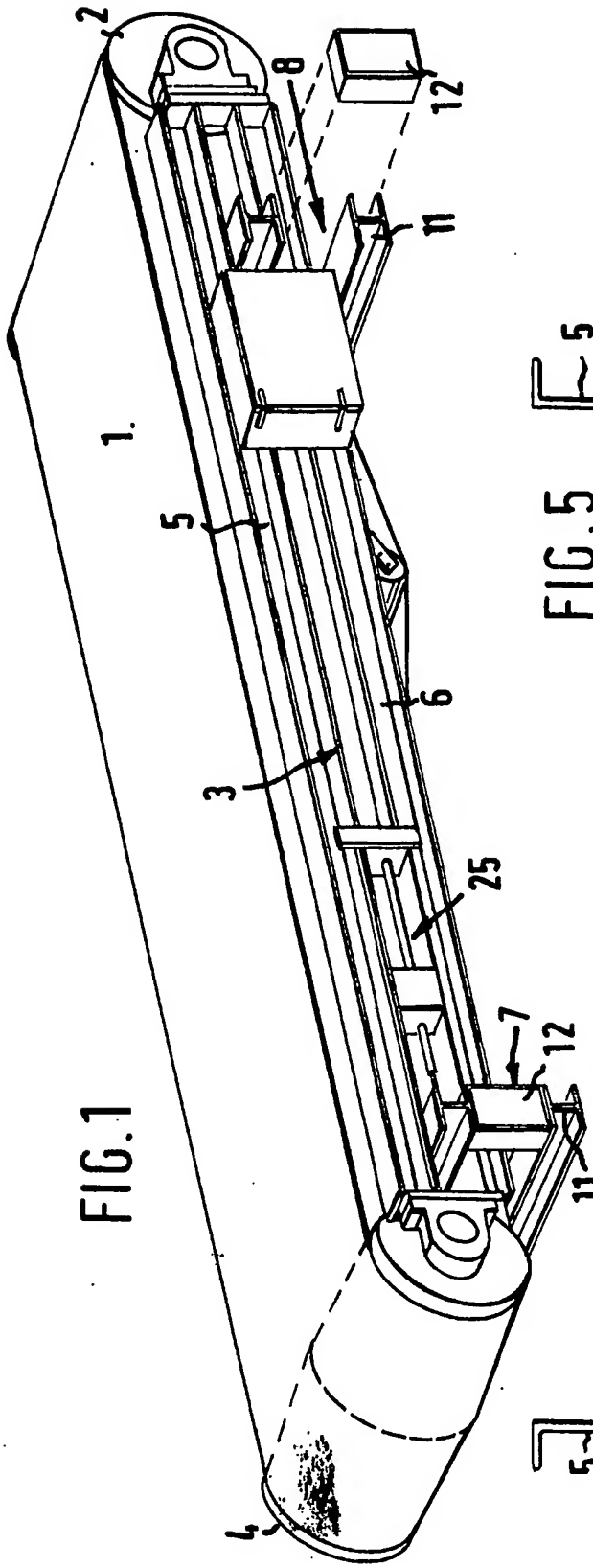

FIG.1

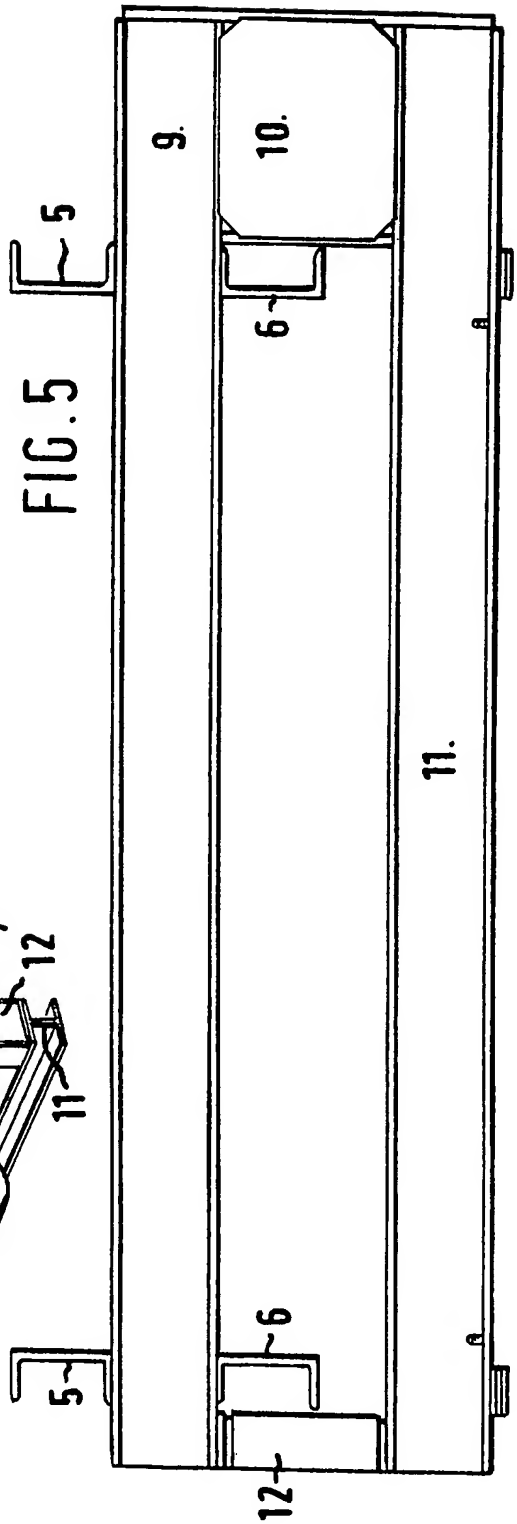

FIG.5

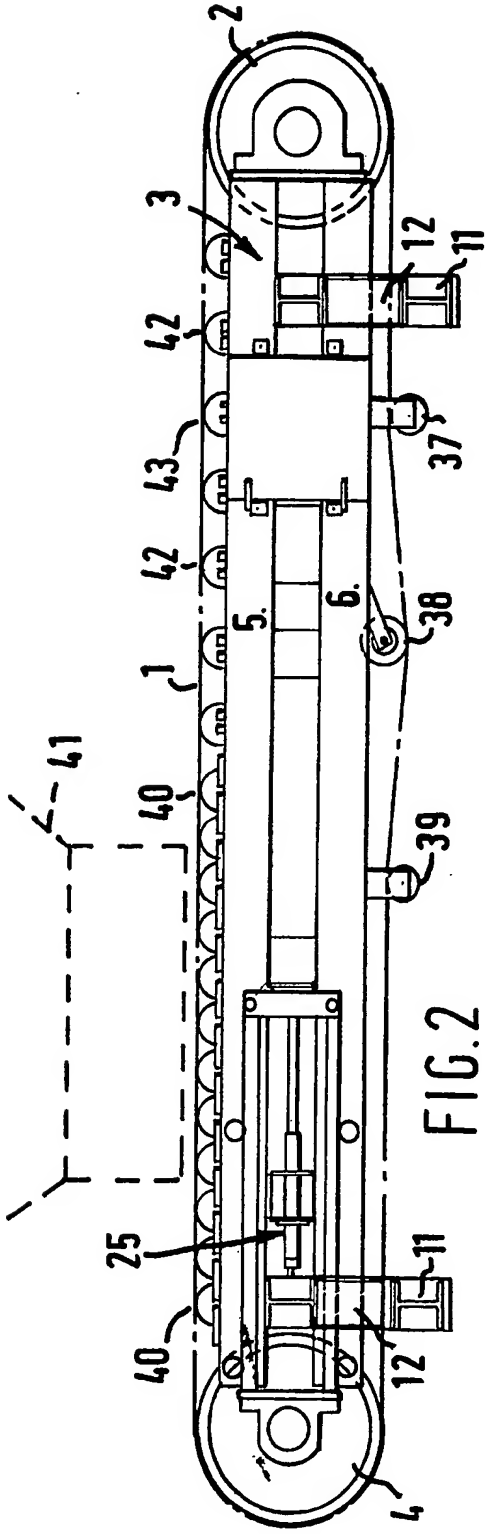
2
3
12
11
42
43
42
37
38
5.
6.
1
41
40
39
25
11
40
12
4

FIG.2

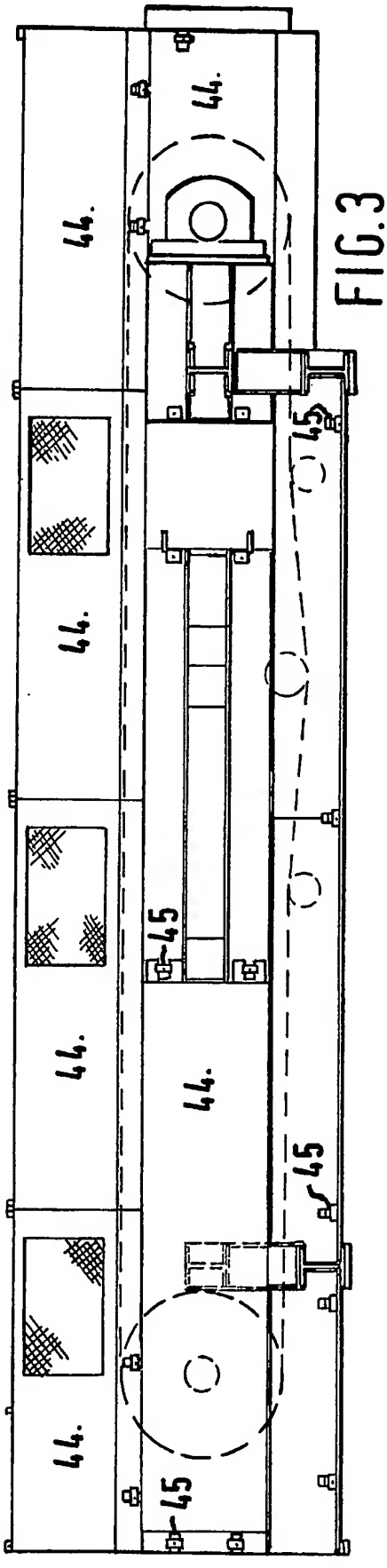
44.
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FIG.3

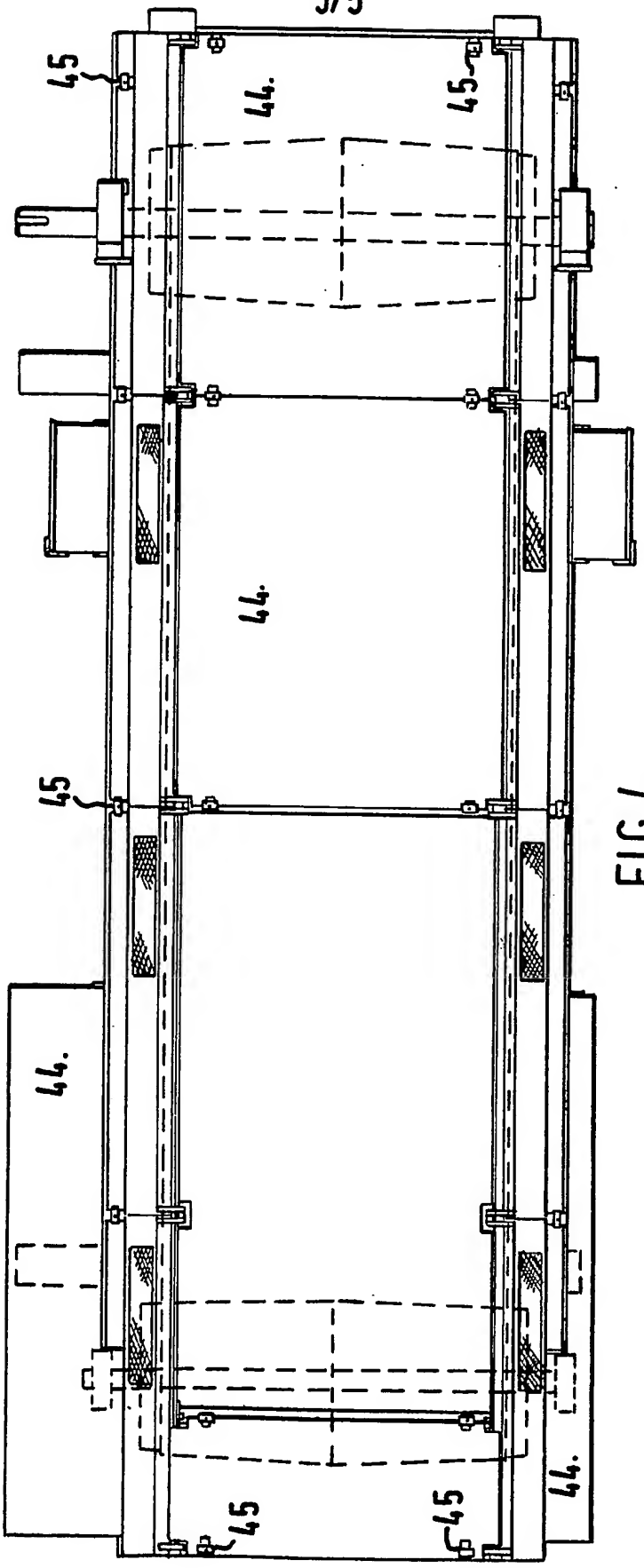

FIG.4

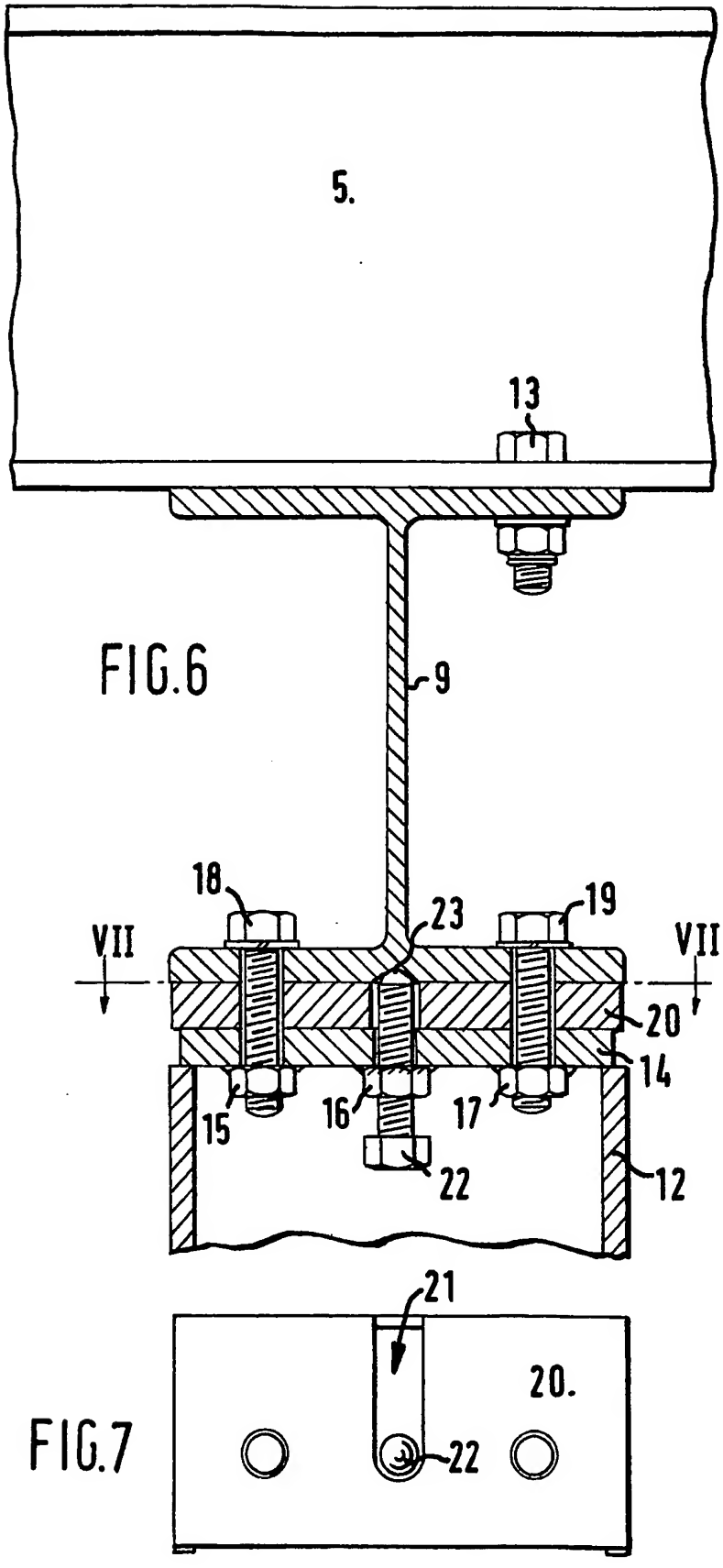

FIG.6

FIG.7

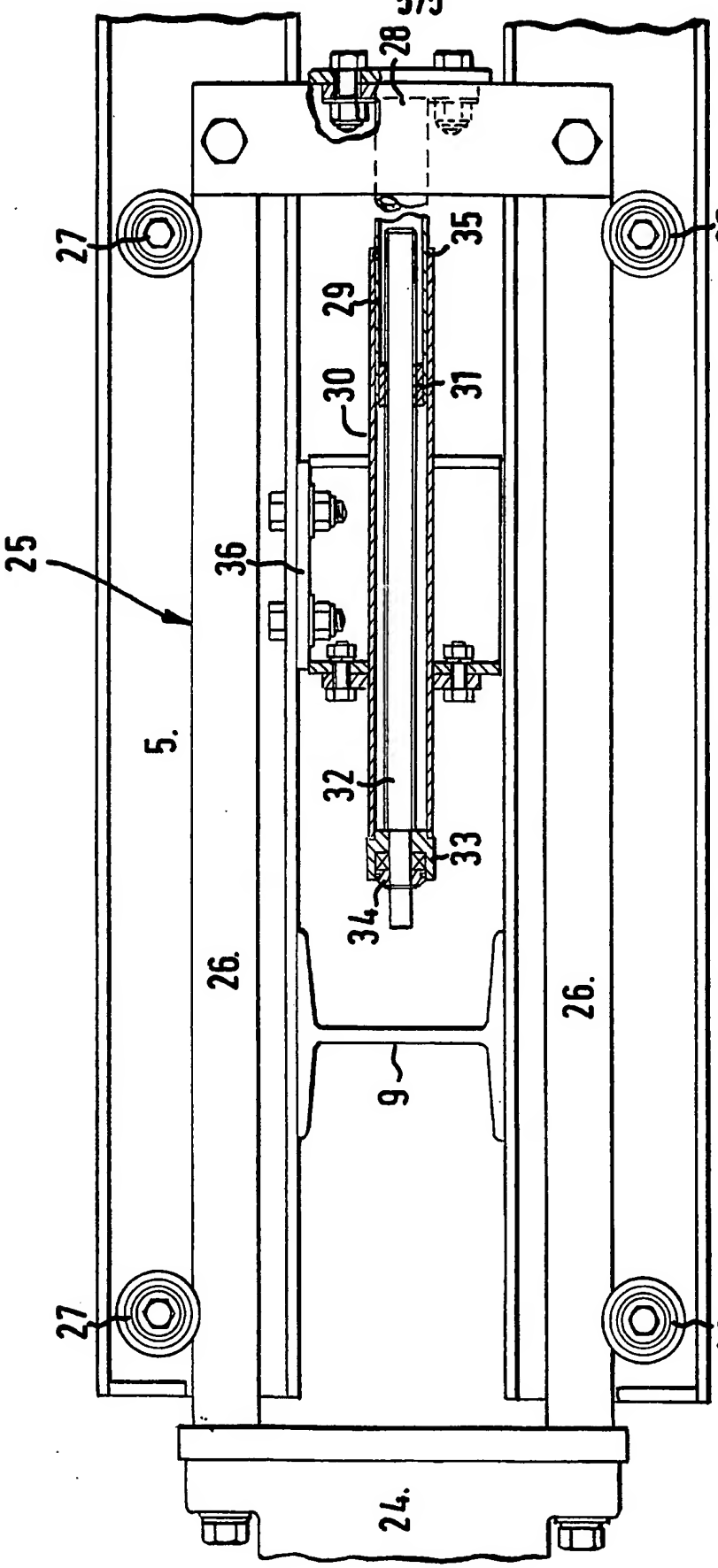

FIG.8

SPECIFICATION
Conveyor Belt Feeders

This invention relates to endless loop conveyor belt feeders and it particularly relates to a construction that enables a belt loop to be readily and rapidly replaced.

In known conveyor belt feeders, and particularly belt weighers for dense material such as coal or iron ore, belt replacement, is a major problem and it can take a considerable time to replace a worn belt. The construction of known belt feeders or weighers requires the in situ joining of a length of belting to form a loop on the feeder and/or considerable mechanical disassembly.

It is an object of the present invention to provide a conveyor belt feeder that has a structure that enables a belt that has already been pre-formed into a loop to be fitted onto the feeder with ease, thus enabling the time to replace a belt to be significantly reduced.

According to the present invention, an endless loop conveyor belt feeder has belt rollers journalled on an elongate frame that is supported by a cantilever structure capable of supporting the frame along one side only, at least when the feeder is not in use, to enable a pre-formed belt loop to be passed over the other side of the frame and fitted over the rollers.

In a preferred form of the invention, the cantilever structure is C-shaped with a removable pillar to bridge the open ends of the structure to give further support to said other side of the frame, especially when the feeder is in use.

The removable support pillar may be provided with a built-in jack to aid in the removal thereof.

Other features of the invention include:—

(a) a tail drum that is mounted on a sub-frame that is slideable longitudinally on the main frame to form a belt loop length take-up unit;

(b) means to set and maintain belt tension automatically;

(c) quick-release dust covers for the feeder; and

(d) means to automatically monitor belt position and adjust the tail drum to maintain lateral position of the belt on the rollers.

The above and other features of the invention are illustrated by way of example on accompanying drawings of a belt weigher, of which:—

Fig. 1 is an isometric view of the belt weigher with dust covers and ancillary equipment removed.

Fig. 2 is a side elevation corresponding to Fig. 1,

Fig. 3 is a view corresponding to that of Fig. 2 but with the covers in place.

Fig. 4 is a plan view corresponding to Fig. 3,

Fig. 5 is a detail end elevation of the frame and C-shaped cantilever support structure,

Fig. 6 is a detail side elevation of a removable support pillar,

Fig. 7 is a section on the line VII—VII of Fig. 6, and

Fig. 8 is a detail side elevation of a tail rotor subframe, with an integral jack.

As shown, the belt weigher consists of an endless loop conveyor belt 1 passing around a drive drum 2, the drum 2 being journalled at one end of an elongate frame 3, along and below the frame to a tail drum 4, the drum 4 being located at the other end of the frame, and thence back over the frame to the drive drum.

The frame 3 is generally rectangular and has upper and lower C-section side rails 5 and 6 along each side.

The weigher is supported at two points 7 and 8 between its ends by C-shaped structures, of which one is shown in more detail in Fig. 5. Each support structure consists of a top I-section beam 9 passing transversely across the frame 3 between,and attached to, each pair of side rails 5 and 6 and a vertical, reinforced pillar 10 connected both to one end of the top beam 9 and to the corresponding end of a bottom I-section beam 11 aligned under the top beam. The top beam 9, vertical pillar 10 and bottom beam 11 form a C-shaped cantilever structure. The structures are designed and stressed so that two can support the weigher and the weight of any likely static load and ancillaries to be mounted thereon. In the embodiment described, the structures were not designed to support the weigher when in use, i.e. with the belt running and a load being weighed.

Additional, removable pillars 12 are connected between the free ends of the upper and lower beams 9 and 11 to provide additional support to the weigher for when it is running and under load. In Fig. 1 one replaceable pillar 12 is shown in place at support point 7 and a second pillar 12 is shown removed from point 8.

With such a relatively massive construction and loads of several tons, the top beams 9 tend to have a downwards displacement at their free ends, loading the support pillars 12. The top beams therefore need to be jacked-up to enable the pillars 12 to be removed.

An additional feature of the invention is the provision of a built-in screw jack for each pillar and this is shown by Figs. 6 and 7. As shown, an upper beam 9 is bolted at 13 to a top frame rail 5. The upper plate 14 of the box section removable pillar 12 has three nuts 15, 16 and 17 aligned below holes in the plate 4 and welded to the underside thereof. Nuts 15 and 17 receive bolts 18 and 19 passing through clearance holes in the lower flange of beam 9 and in a packing piece 20 interposed between the beam 9 and the pillar 12. Bolts 18 and 19 join the pillar and beam together when the weigher is in use. The bottom of the pillar 12 is either similarly bolted to lower beam 11 or is provided with set holes to mate with locating pins upstanding from the upper flange of lower beam 12 (neither form being illustrated).

The packing piece 20 also has a slot 21 running from the centre of the piece to one side

thereof. A third bolt 22 is screwed upwardly through nut 16 and slot 21 in packing piece 20 to locate in a recess 23 in the underside of the lower flange of upper beam 9.

When bolts 18 and 19 have been removed, bolt 22 is screwed upwardly until the load on the packing piece 20 has been relieved and the piece can be slid out. The thickness of the piece 20 is greater than the unsupported downwards deflection of the free end of the upper beam 9. Thus bolt 22 can be screwed down and, although the beam 9 will deflect downwardly, sufficient clearance will remain to allow the pillar 12 to be removed.

As shown in Figs. 1 and 2 and in more detail in Fig. 8, the tail drum 4 is journalled between a pair of bearings 24 each bolted to the rear end of a sub-frame 25. The sub-frames each consist of a pair of square-section parallel bars 26 arranged longitudinally on the weigher frame 3 and running between two vertically opposed pairs of rollers 27 journalled on upper and lower side rails 5 and 6 respectively. As previously stated, the rear ends of the bars 26 are bolted to the bearing 24.

The front ends are connected to a yoke 28 and the front end of a tube 29 is also bolted to the yoke 28 centrally between and parallel to the rods 26. The tube 29 is telescopically slideable within another, outer tube 30 and carries at its rear end nut 31 for an elongate screw 32 carried concentrically within the tubes 29 and 30 and supported in a bearing 33 at the rear end of the outer tube 30. The rearmost end of the screw 32 protrudes through the bearing 33 and a dust seal 34 and is secured so that the screw may be turned by a spanner, and is keywayed for attachment of a hand wheel. The front end of the outer tube 30 is to act against the inner tube 32 to prevent dust reaching the screw.

The outer tube 30 is bolted to a bracket 36 itself bolted to the upper side rail 5. Rotation of screw 32 will move the sub-frame 25 longitudinally fore and aft on the main frame 3 and hence the tail drum 4 can readily be moved in and out.

Fig. 2 also illustrates the actual run of the belt loop 1 around the weigher. Starting with the drive drum 2 the belt passes under the frame 3 over an idler roller 37 under a gravity or dancing roller 3 and over another idler roller 39 to the tail drum 4. The idler rollers 37 and 39 are mounted on detachable brackets depending from the lower side rail 6 and the gravity or dancing roller 38 is freely pivoted to the frame 3. The effect of the dancing roller 38 between the idler rollers 37 and 39 is to automatically set and maintain the belt tension, within limits set by the travel of the dancing roller.

After passing around the tail drum 4 the belt 1 rests on a series of idler rollers 40 journalled closely one to another on the upper side rail 5. These rollers take the load of material to be weighed that is delivered to the weigher via a feedbox 41 indicated in broken line. The upper side rail 5 also carries further idler rollers 42 either side of the weigh roller 43.

In use, the weigher and ancilliary equipment is enclosed in dust covers 44 that are shown in Figs. 3 and 4. These covers 44 are held in place by quick release turn-buckles 45.

To change a belt, the flow of material being weighed is first stopped or isolated by a gate or the like (not shown) in the material feed path to the feed box. The dust covers 44 are removed, the removable pillars 12 are removed using their integral jacks as hereinbefore described, the dancing roller 38 is jacked up, the brackets for the idler rollers 37 and 39 are unbolted and the rollers dropped and the existing belt can then be removed. The tail drum sub-frames 25 are moved forwards to reduce the belt path length and the new belt loop is fitted sideways over the main frame 3. The weigher is then reassembled in the reverse procedure to that described above. Once the dancing roller 38 has been unjacked, the tail drum 4 is moved rearwardly until the dancing roller 38 "lifts", thus setting belt tension.

It will be appreciated that the method of mounting the tail drum 4 enables it to be moved differently on one side with respect to the other. This differential movement can render the tail drum non-parallel with the drive drum and rollers and has the effect of "steering" the belt transversby of the frame.

It is a further, unillustrated, embodiment of the present invention to provide means to monitor belt position transversely of the weigher and servo-control means to detect when transverse belt movement exceeds pre-set limits and drive the screw 32 of one of the sub-frames 25 only to asymmetrically move the tail drum to steer the belt until its transverse position is again within the said pre-set limits.

Claims

1. An endless loop conveyor belt feeder having belt rollers journalled on an elongate frame that is supported by a cantilever structure capable of suporting the frame along one side only, at least for when the feeder is not in use, to enable a pre-formed belt to be passed over the other side of the frame and fitted over the rollers.

2. A belt feeder as claimed in claim 1, wherein the cantilever structure is C-shaped with a removable pillar to bridge the open end of the structure to give further support to said other side of the frame, for when the feeder is in use.

3. A belt feeder as claimed in claim 2, wherein the removable support pillar is provided with a built-in jack to aid in the removal thereof.

4. A belt feeder as claimed in claim 3, wherein the support pillar includes jacking means acting between the top of the support pillar and the adjacent open end of the cantilever structure and a packing piece interposed between the top of the support pillar and said adjacent open end of the cantilever structure, the packing piece being shaped to be removable sideways of the pillar when the jacking means has been operated and

having a thickness greater than the free downwards deflection of said adjacent open end of the cantilever structure.

5. A belt feeder as claimed in any of the preceding claims, wherein the elongate frame is supported at each of two points intermediate its ends by a C-shaped cantilever structure and the belt passes around a drive drum journalled at one end of the frame and a tail drum located at the other end of the frame.

6. A belt feeder as claimed in claim 5, wherein the tail drum is journalled on a sub-frame that is movable longitudinally with respect to the main frame to provide adjustment for varying lengths of belt.

7. A belt feeder as claimed in any of the preceding claims wherein means are provided to automatically set and maintain belt tension.

8. A belt feeder as claimed in claim 8, wherein the belt tension means consists of a gravity or dancing roller located between a pair of idler rollers.

9. A belt feeder as claimed in any of the preceding claims and provided with dust covers to enclose the feeder, the dust covers being attached to the feeder by means of quick-release fasteners.

10. An endless loop conveyor belt feeder substantially as described with reference to or as shown by the Drawings.

11. A belt weigher incorporating a belt feeder as claimed in any one of claims 1 to 10.

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